EARTHQUAKE IN THE MIDLANDS.

EARTHQUAKE shocks were felt at many places in the midland counties about 1.30 p.m. on Tuesday. The reports which have been received up to the time of going to press show that the counties of Derby, York, Stafford, Cheshire, Notts and Leicester were affected by the disturbance. Two shocks were felt at most places, one a few minutes after the other. Though no very serious damage was done, the rumbling noise and the vibrations due to the earthquake caused much alarm, and people ran from their houses into the streets. We give below a summary of the reports which have appeared in the daily papers, and the report of an interview with Prof. Milne, published in Wednesday's *Daily Mail.*

DERBYSHIRE.—*Derby.* Shocks felt at 1.10 p.m. Duration, 5–10 seconds. Houses shaken, windows rattled, and crockery overturned. Rumbling noises heard. Second shock at 1.29 less severe.—*Matlock Bath.* Two shocks at about the same time as Derby. Duration, about 45 seconds. Slight rumbling sound.—*Alfreton.* Three shocks. Many buildings shaken and cracked. Chimney overthrown.—*Ashbourne.* Chimney overthrown.— *Buxton and Bakewell.* Pictures and ornaments displaced by vibration of walls of houses, and crockery overthrown.

NOTTINGHAMSHIRE.—*Nottingham.* Time about 1.30 p.m. Duration, 5–6 seconds. Large buildings in centre of city seen to sway.

YORKSHIRE.—*Sheffield.* Slight shocks felt.—*Dore.* Time, 1.30 p.m.–1.40 p.m. Houses shaken, bells rang, windows and crockery rattled.—*Baslow.* Rumblings heard and houses and objects shaken.

STAFFORDSHIRE.—*Burton-on-Trent.* Two shocks felt at 1.30 p.m. Windows violently shaken, and crockery and furniture rocked by prolonged vibrations.—*Stafford.* Time, 1.40 p.m. Two shocks. Vibration of ground felt, and objects overturned.—*Uttoxeter.* Time, 1.32 p.m. Duration, about a minute. Tables and chairs moved several inches. Doors and windows rattled. Bells rang.—*Hanley.* Time, 1.40 p.m. Duration, 30–40 seconds. Tables and chairs rocked, and many objects overthrown.—*Leek.* Time, 1.35 p.m. Rumbling noise heard, followed directly afterwards by vibration. Second shock of greater intensity felt a few seconds later. Shocks also felt at Stoke, Longton and Kidsgrove.

CHESHIRE.—*Northwich.* Time, 1.30 p.m. Decided movement. Objects displaced.—*Comberbach.* Chairs rocked as though heavy traction engine was passing.

EAST LANCASHIRE.—*Blackburn.* Time, 1.15 p.m. Crockery overthrown. Second but less severe shock at 1.35.

Prof. Milne's Views.

"My seismograph photographic films are not yet developed, but they will be to-night, and I shall see whether vibrations of this shock reached as far as the Isle of Wight. It is very doubtful whether they did, because my instruments are not constructed to record the exceedingly rapid vibrations which we get from local shocks.

"The probability is that this earthquake is similar to those which from time to time have had their origin in Leicestershire and the Severn Valley, the last of which was on December 16, 1896. That occurred about 5.30 a.m., and about Hereford did a considerable amount of damage in shattering buildings. In fact, its destructive effect was felt even as far as Birmingham, while people were awakened at Alderley Edge, Manchester, and in towns further north. The vibrations extended eastwards, certainly as far as London.

"This latest earthquake probably means that there has been some adjustment or slight slip on the line of a pre-existing fault or fracture in the earth's crust. Careful observation of the times at which this has been felt in different parts of Great Britain will no doubt lead to the determination of the extent of such fault, and thereby help the work of the Geological Survey.

"A very feeble trace of the last Severn earthquake was obtained in the Isle of Wight, but it was difficult to distinguish between what were earthquake and what artificial disturbances. In order to make this distinction in regard to local shocks, it will be necessary for some enthusiast to isolate himself in the centre of a district like Dartmoor, and live the life of a hermit."

NOTES.

THE investigation of the properties of radium salts has led to many remarkable results, among which those contributed by MM. P. Curie and A. Laborde to the current number of the *Comptes rendus* are not the least remarkable. They adduce evidence to show that radium salts give off heat continuously. The experiments were made in two ways. Two small bulbs, one containing 1 gram of a radiferous barium chloride containing about 1/6 of its weight of radium chloride and the other containing a similar weight of ordinary barium chloride, were placed under similar thermal conditions with a junction of a thermocouple in each bulb. The bulb containing the radium preparation proved to be 1°·5 hotter than the other, and this temperature difference was maintained. An independent confirmation was obtained with the Bunsen ice calorimeter. At the moment the radium bulb was introduced, the mercury, which was previously stationary, commenced to move along the tube with a perfectly uniform velocity, and on the bulb being taken out the mercury stopped. From these experiments, which are given as preliminary and only roughly quantitative, the authors conclude that a gram of pure radium would give off a quantity of heat of the order of 100 calories per hour, or 22,500 per gram-atom per hour, a number comparable with the heat of combustion in oxygen of a gram-atom of hydrogen. The disengagement of such a quantity of heat cannot be explained by the assumption of any ordinary chemical transformation, and this excludes the theory of a continuous modification of the atom. The heat evolution can only be explained by supposing that the radium utilises an external energy of unknown nature.

REPORTS of the following volcanic eruptions and earthquakes have appeared since we went to press last week:—*Vienna.* Violent earthquake shocks were experienced during the night of March 19 and early in the morning of March 20 in the Semmering district and the Mürz Valley, in Styria. March 21. *St. Thomas.* Mont Pelée emitting dense clouds. March 22. *St. Thomas.* There was a violent eruption of the St. Vincent Soufrière. Kingstown was covered with a dense black cloud, the sun being completely obscured. Three inches of sand and rock fragments have fallen at Georgetown and Château Belair. *Barbados.* Complete darkness caused by fall of volcanic dust from the Soufrière. *Dominica.* Frequent loud detonations heard to the south-east, and clouds of dust seen to westward. *Kaiserslautern.* At 6 a.m., and again at 2 p.m., violent earthquake shocks were felt almost everywhere in the south of the Bavarian Palatinate from Landau to Wörth. *Cuneo* (*South Piedmont*). Earthquake shocks felt, but no damage done. March 23. *Grenada.* Eruption of the Soufrière began 6.30 a.m.; immense clouds, comparative absence of lightning a feature; no injury beyond heavy fall of sand and small stones two to three inches at Georgetown; quieted down during afternoon. March 24. Earthquake in the Midland Counties (see adjacent column).

THE West African Company's steamship *Sokoto,* which arrived at Plymouth on March 20, reports having encountered a sandstorm. The report reads as follows:—"The vessel was enveloped for eight days in a sandstorm off the African coast. So dense was the sand that speed was reduced owing to the impossibility of seeing far ahead, and even at midday passengers had to resort to artificial light for the purposes of reading. The ship was navigated by dead reckoning, it not being possible to secure observations. The storm is described as the worst in an experience embracing twenty-five years."

THE annual meeting of the general board of the National Physical Laboratory was held at Bushy House, Teddington, on Friday last. Lord Rayleigh, the chairman of the board, was supported by Sir F. Hopwood, Sir E. Carbutt, Sir W. Preece, Sir A. Rücker, Col. Crompton, Mr. A. Siemens, Prof. Perry, Prof. Larmor, Mr. Kempe, Mr. Stromeyer, and a large number of other members of the board. The annual report of the executive committee, giving details of the work since the opening of the laboratory by H.R.H. the Prince of Wales, was approved. It appears from the report that subscriptions and donations amounting to nearly 1000*l.* a year have been promised by the Institution of Civil Engineers, the Iron and Steel Institute, the Institute of Chemical Industry and various private firms. Efforts are being made to extend the list, and more especially to render the laboratory self-supporting by increasing the work done for firms and private individuals. Examples of such work are given in the report, and in a lecture recently delivered at the Institution of Mechanical Engineers by the director. The scheme of work suggested by the director for 1903 was also approved. After the meeting an inspection of the laboratory took place, and in this the board was accompanied by a number of gentlemen who have assisted the laboratory by serving on its various committees or as donors of apparatus. Among the visitors were Sir Herbert Jekyll, of the Board of Trade; Sir Thos. Elliott, of the Board of Agriculture; Sir Wm. White, Commander Sclater, of the Admiralty; Sir Oliver Lodge, Mr. Dewar, M.P., the Master of the Mercers' Company, Col. Vickers, Mr. Smith Carington, of Messrs. Sir W. G. Armstrong, Whitworth and Co.; Mr. Swinburne, Mr. Ferranti, and many others.

THE death is announced, at seventy-five years of age, of Prof. M. S. Voronin, member of the Imperial Academy of Sciences at St. Petersburg, and distinguished by his botanical work.

THE U.S. National Geographic Society has awarded the Cullum medal to the Duke of the Abruzzi for his ascent of Mount St. Elias and his Arctic explorations.

THE competition for the prize offered by the Academy of Verona for a historical and artistic guide of the city and province of Verona has been deferred until December 31, 1903.

IT is announced in *Science* that Mrs. Rowland has given to the Johns Hopkins University the library of the late Prof. Rowland relating to spectroscopy, and a former student has given more than 1000*l.* to purchase books on this subject. With these gifts there will be established a "Henry A. Rowland Memorial Library," to contain publications in the field of radiation and spectroscopy.

MR. OTTO J. KLOTZ, astronomer of the Department of the Interior, Canada, leaves shortly for the Pacific, in charge of the longitude determinations along the British Pacific cable. It is stated in *Science* that the stations occupied will be Vancouver, Fanning, Suva, Norfolk and Southport, near Brisbane, Australia. Connection will also be made with New Zealand from Norfolk, where the cable bifurcates.

ACCORDING to Reuter's Agency, Mr. Fiala, the leader of the new North Pole expedition which Mr. Ziegler is despatching to the Arctic, is leaving at once for Norway to join the steamer *America*, which has been lying at Tromsö since the return of the expedition last year. Provisions and stores for two years will be taken, and on leaving Tromsö the *America* will steam direct for Archangel, where she will embark fresh supplies. Mr. Fiala states that the main idea is to make a forced march to the Pole from a base of supplies.

PROF. F. J. STUDNICKA, whose death occurred on February 21, was a prolific and versatile author. The long list of his papers begins with two or three on physics proper, but his work was mainly in the field of pure mathematics. Among the subjects on which he wrote are determinants, chain-fractions, congruences, magic squares, the eight-square theorem in arithmetic, definite integrals, and quaternions. Meteorological questions seem to have interested him always, and he published several papers on rainfall. Besides all this he was the author of various mathematical treatises, and professor of mathematics in the University of Prague.

THE tercentenary of the close of Queen Elizabeth's reign was celebrated by the Royal Geographical Society on March 23 at an interesting gathering, at which special stress was laid on the importance of that memorable reign as the starting point of progress in every branch of geographical science. The names of the great sailors of those days have become such household words that an occasion of the kind was hardly needed to impress upon the public the great results which have followed from those early beginnings of nautical enterprise. But it is far less generally recognised that the Elizabethan era was quite as important from the point of view of the more scientific branches of the subject, and this fact was clearly demonstrated by Sir Clements Markham in his opening address, in which the services rendered by such men as Hakluyt, Davis, Wright, Blundeville, and Saxton to the science of surveying and map-making was fully set forth. A special address by Prof. Silvanus Thompson emphasised the value of the work of William Gilbert as the first to reduce to a connected system the vague notions previously prevalent on the subject of magnetism, and showed that though by no means free from error, Gilbert's theories were the starting point from which the gradual elimination of those errors followed in due sequence. Short addresses by Mr. Edmund Gosse and Mr. Julian Corbett dealt with special aspects of the work of Raleigh and Drake, while an interesting exhibition illustrated the geographical achievements of the reign in the form of books, maps, instruments, and so forth.

IN the House of Commons on Monday, in answer to a question with regard to the fitting of coastguard signal stations with wireless telegraphy apparatus, Mr. Arnold-Forster said:—The following stations have been established: Dover, Culver Cliff, Portland, Rame Head, Scillys, and Roches Point. The following are proposed to be fitted during the next financial year:—Bere Island, Spurn Head, Alderney, St. Abb's Head, St. Ann's Head, Languard, Port Patrick, Duncansby Head. As regards commercial signalling, it is proposed to carry this out from the stations which will be included in the new Lloyd's-Admiralty agreement, which are:—Culver Cliff, Scillys, Spurn Head, St. Abb's Head, St. Ann's Head, Duncansby Head, and Roches Point.

IT is announced in the Boston *Transcript* that a plan has been definitely approved for holding an International Congress of Arts and Sciences at the St. Louis Exposition on September 19–September 30. The congress will attempt to correlate the scattered theoretical and practical scientific work of our time In each of the various subdivisions two papers will be presented—one on the history of that particular department of knowledge during the past one hundred years, and the other on the problems that now present themselves for solution in that field. Profs. Simon Newcomb of Washington, Hugo Münsterberg, of Harvard University, and A. W. Small, of the University of Chicago, have been entrusted with the arrangement of the details. It is expected that these three American men of science will spend shortly several months in Europe, conferring with leading European men of science with a view to secure their full cooperation.

THE *Atti dei Lincei* announces that the subject for the Carpi prize for 1903–4 is "Contributions to the Study of the Functions of the Liver in the Animal Series."

IN its *Rendiconti* (xxxvi. 1), the Reale Istituto Lombardo publishes its annual list of prize awards, and subjects for prizes for future years. The following prizes are unawarded:—The ordinary prize of the Institution, the Cagnola prizes for essays on the cure of pellagra and the steering of balloons, the Fossati prize, and the Secco Commeno prize. Under the Cagnola foundation, a prize of 2500 lire and a gold medal of 500 lire are awarded to Prof. G. B. Grassi, of Rome, for his works dealing with the nature of miasma and contagion. Under the same foundation, no other prizes have been awarded, but special awards of 800 and 700 lire have been made to two anonymous competitors on the subject of effect of fumes from manufactories on vegetation, and 1000 lire have been similarly given to one competitor on the subject of prevention of forgery of documents. The Kramer prize of 4000 lire has been awarded to Carlo Valentini, engineer, for his work on the prediction of the floods of the Po. In connection with the Zanetti prize for Italian pharmacists, 700 lire have been awarded to Prof. Egidio Pollacci (Pavia), and 300 lire to Edoardo Baroni (Turin). For the Brambilla prize for manufacturers of Lombardy, seventeen competitors have entered, and the commission has awarded a gold medal and 600 lire to Dr. Daniele Crespi for mercerisation of cotton, &c., the same to Pastori and Co., steel pen makers, a gold medal and 400 lire to Marx and Co. for table cutlery, the same to Besana, Felice, Comi and Co. for hot water and steam heating apparatus, to Ercole Marelli and Co. for electric ventilators, and to M. Boschi and Co. for transparent glass plates for pavements. Awards of 300 lire have been made to Angelo Mantegazza for Italian paste, and to Biagio Bigioggero for seamless upper leathers for shoes. As in previous years, the awards indicate keen competition and progress by rapid strides among the Lombardy manufacturers, while the subjects in pure science attract comparatively few competitors.

FOR future prize competitions, the Reale Istituto Lombardo gives a programme of which the following is a brief summary. The Institution prize for 1903, for developments of Lie's theory of groups; for 1904, on the work of Vittorio Alfieri; the two triennial medals for 1903, for the promotion of agriculture and the introduction of manufacturing industries in Lombardy. The Cagnola prize for 1903, for a monographical study of hypophysis; and for 1904, on the velocity of kathodic rays. The Cagnola prizes on subjects chosen by the founder, cure of pellagra, nature of miasma and contagion, direction of balloons, and prevention of forgery. The Brambilla prize, for manufacturing industries in Lombardy. The Fossati prize for 1903, on the so-called nuclei of origin or termination of cranial nerves; for 1904, on the localisation of cerebral psychic motory or sensory actions; for 1905, on our state of knowledge in neurology. The Kramer prize for 1903, on systems of electric traction. The Secco Comneno prize, on the virus of rabies; Ciani prizes, for published books of the following classes—historical for 1903, narrative or dramatic for 1906, scientific (with preference to philosophy and education) for 1909, the book in each case to have appeared within the eight years preceding the award; also an extraordinary Ciani prize for 1904 for an unpublished Italian popular book. The triennial Zannetti prize for 1905, for progress in pharmaceutical chemistry. Finally, the Tommasoni prize for 1905 is for the best history of the life and works of Leonardo da Vinci.

BY the death, at the early age of fifty-eight, of Dr. Gustav Storm, professor of history at the University of Christiania, Norway in particular, and the world of scientific historians in general, have sustained a loss which it will take a long time to repair. In his own university, his superior intellectual qualities, his indefatigable energy and high character secured for him a position of unique importance and influence; while abroad he was looked upon as the typical representative of scientific research in the wide domain of history. As the main task of the man of science is to weigh and measure with the greatest possible accuracy, so Storm made it his chief business to sift with the utmost minuteness the secondary from the primary sources of historic evidence, and on the results obtained to measure time and truth in history. The only work of his we know of which, in this respect, fell short of success was his "Critical Contributions to the History of the Viking Age" (1878), directed against the redoubtable author of "Normannerne," Prof. Steenstrup, of Copenhagen, and referring to the everlasting contest between Norwegian and Danish historians on the question as to which of their respective nations can lay the best substantiated claim to the lion's share in the glory of the *furor Normannorum.* At the age of seven-and-twenty (1872), Storm won the gold medal of the Royal Society of Copenhagen for a singularly thorough and lucid treatise on the sources, manner and method of the historical writings of Snorri Sturluson, a work which still maintains its standard authority unimpeached. Two years afterwards he published another work of standard value, in which he submitted to a searching criticism the legendary cycles round Charlemagne and Theodoric the Goth with a view of ascertaining what historical elements lay hidden under the heap of mediæval romance. In 1877 he was appointed to the chair of history; in 1883 he was elected perpetual secretary general of the Royal Society (Videnskubernes Silskab) of Christiania; in 1886 he became perpetual chairman of the commission for editing the "Fontes" of Norwegian history. He was the author of a large number of important works, and contributed numerous important papers to the *Transactions* of the Royal Society of Christiania, to *Historisk Tidskrift*, to *Aarböger för nordisk Oldkyndighed*, to *Arkiv för nordisk Filologi*, besides a yearly review, from 1876, on Norwegian historiography to the *Revue Historique.*

A SMALL pamphlet entitled "Über die neueren Dämmerungserscheinungen," by Herr P. Gruner (extract from *Mitteilungen der Naturforschenden Gesellschaft in Bern,* 1903), contains some facts relating to the appearances of coloured sunrises and sunsets during last year caused by the volcanic eruptions in the West Indies. Herr Gruner, from a discussion of the days in each month when this phenomenon was observed, suggests that they indicate a periodicity corresponding with the times of new moon. That this may be so seems more natural than otherwise, since the bright moon in the sky would most probably have a tendency to render very difficult the observation of this phenomenon.

PROF. H. HILDEBRAND HILDEBRANDSSON has just issued the first portion of his report to the International Meteorological Committee on the International observations of clouds, which contains, as an introduction, an interesting summary of the history of the general circulation of the atmosphere. The volume includes the results of computation of all observations of cloud movements which he has been able to collect, the mean directions being determined by the "resultantomètre" of M. Sandström, which gives them to one or two degrees. Numerous plates, twenty-two in all, accompany the report, twenty of which give the mean directions of the wind each month, and for several places scattered over the earth's surface. The book is a valuable contribution to this branch of meteorology.

THE Danish Meteorological Institute has published its valuable annual statement relating to the state of the ice in the Arctic seas in 1902, with charts for each month, from March to August. Some of the general results show that the winter ice broke up very late, that the Polar ice lay nearer Asia and Europe than usually, and that the number of icebergs carried from Greenland to the temperate seas was notably smaller than usual. Also that the summer of 1902 has been rough and unsettled in nearly all Arctic and sub-Arctic regions, northerly and easterly winds predominating in Atlantic Arctic seas. No safe conclusions for 1903 can be drawn from the limited data available, but conditions appear favourable for the passage of a considerable number of icebergs east of Labrador and Newfoundland.

WE have received the "Instructions to Observers of the Indian Meteorological Department," by Sir John Eliot. This book, which is the second edition, is intended to supersede the Indian meteorologist's vade-mecum, now out of print. It is confined simply to a description of the various instruments in use at the meteorological stations in India, the precautions to preserve them in good condition, the methods to restore them to good order when it is possible for the observer to do so, and the proper methods of reading the instruments and of taking and recording the observations. It may be mentioned that these "instructions" are so limited because at the present time the observers in India merely take the readings of certain instruments and forward them on suitable forms to the head office, all the work of reduction and preparation for subsequent use and discussion being done there. For this reason explanations as to the methods of applying corrections, and the procedure of reduction, &c., are absent. The book, however, will be useful nevertheless to observers not stationed in India, especially that portion showing the conditions to be fulfilled in the selection of a site for a meteorological station.

ACCORDING to the *Daily Mail*, six of the Cunard Steamship Company's liners have been equipped with printing machinery for the publication of a paper the news of which is supplied by wireless telegraphy. A facsimile of the front page of the paper published on board the *Etruria* and called the *Cunard Bulletin* was printed in the *Daily Mail* of March 14.

AN interesting paper on distribution losses in electricity supply was read by Messrs. Constable and Fawssett before the Institution of Electrical Engineers. The figures given in the paper have been obtained from the working of the Croydon central station, which has an output of 1250 k.w. Roughly, the total losses amount to 21 per cent. of the units generated, and are divided up as follows:—Switchboards and connections, 0·5 per cent.; cable losses, 8·5 per cent.; transformer losses, 9 per cent.; and meter losses, 3 per cent. The authors consider the losses under each heading separately, and suggest ways in which they may be reduced; the greater part of the paper is devoted to the cable losses, which are the most important and the least easy to reduce.

SOME measurements of the temperature coefficients of magnets made of chilled cast iron are described by Mr. B. O. Peirce in the *Proceedings* of the American Academy of Arts and Sciences. Castings of a size and shape suitable for instrument magnets gave for the temperature coefficient between 10° C. and 100° C. mean values of from 0·0003 to 0·0004. These castings had been subjected to a chilling process at the Jefferson Physical Laboratory; another similar magnet treated by an outside maker had the coefficient 0·0008. Unchilled castings were found to have a coefficient five or six times as large as the chilled magnets. The temperature coefficient generally increases with the temperature, the value between 10° C. and 40° C. being possibly only about one-third of the mean value between 10° C. and 100° C. Using such magnets as these in conjunction with galvanometer coils of copper and manganin it is easy, according to the author, to construct a cheap ammeter almost wholly independent of the room temperature.

OUR contemporary the *Electrical Review* has recently published some particulars of the new storage battery invented by Mr. Edison which we described in NATURE more than eighteen months ago (vol. lxiv. p. 241). It seems that the cell is likely soon to be put on the market, and Mr. Edison is reported as having expressed himself as fully satisfied with the trials, and confident of its ultimate success. "The experimenting with the new battery has all been done," he said, "and the only thing that remains is to adapt it to the use of the public." Mr. Hibbert, in the articles referred to above, publishes some discharge curves communicated to him by Mr. Edison's associate, Mr. Dick, which are very similar to the curve which was published in NATURE; the most noticeable point is the large percentage of the ampere-hour discharge obtained at high discharge rates; with eight times the normal discharge rate the cell has 75 per cent. of its normal capacity, which is a very much better performance than that of any lead cell. The watt-hour capacity per pound is the same as originally claimed—about 11—and the cells are said to be of very good mechanical construction and durability. The result of practical experience of the cell in ordinary working will be awaited with great interest; it certainly seems as if we are a step nearer to the production of a satisfactory automobile cell, and to the ousting of lead from its present position as the only material suitable for secondary batteries.

THE December issue of the *Bulletin de l'Académie des Sciences de Cracovie* contains a paper by Prof. Olszewski dealing with three forms of apparatus for the liquefaction of air and hydrogen. Each apparatus is based on the principle of Dr. Hampson's well-known machine; two of them serve to liquefy air, the third is a hydrogen liquefier which can also, if necessary, be used to liquefy air. The first apparatus is intended for use in laboratories when greater quantities of liquid air are to be prepared in a shorter time than it is possible to do by means of the Hampson liquefier. This result is attained by dividing the coil of the Hampson machine into two parts, and inserting between them a CO_2 cooler. The yield of the apparatus is thus doubled. The second apparatus is a true Hampson liquefier, simplified and reduced in size, and wholly enclosed in a partly silvered vacuum vessel. This serves to demonstrate the liquefaction of air during a lecture, without use of a compressor, by means of air compressed in a steel flask. The last apparatus described is a hydrogen liquefier which differs from that of Dr. Travers chiefly by the insertion of a second regenerator coil, which serves almost wholly to equalise the temperatures of the arriving and the issuing hydrogen, and by the absence of a low pressure chamber for liquid air, this refrigerant being used boiling under atmospheric pressure. The preliminary experiments carried out with this apparatus are said to have led to satisfactory results.

A SERIES of articles by Prof. Duhem, of Bordeaux, on the evolution of mechanics, is an important feature of the current numbers of the *Revue générale des Sciences.* It commences in the issue of January 30 with a historical account of the development of dynamics, starting with the Greek notions of matter, and tracing the successive theories of Descartes, Leibnitz, Boscovich, Newton and Laplace. In the second part, Prof. Duhem deals with the principle of virtual velocities and the statics of Lagrange, d'Alembert's principle, the Lagrangian equations of motion, the theories of Poisson on elasticity, hydrodynamics and capillarity, and theories of elasticity generally. The third paper is devoted to Prof. Duhem's favourite subjects of study, heat and electricity, especially the former. The kinetic theory of gases is traced from its first introduction in the "Hydrodynamica" of Daniel Bernouilli down to the latest works of Boltzmann. In the section devoted to thermodynamics, we have an account of the discoveries of the first and second laws, Helmholtz's theory of monocyclic systems, and a detailed examination of Gibbs's recent work on statistical mechanics. The dynamical theories of electricity are considered, with especial reference to Clerk Maxwell. Finally, under "Impossibility of Perpetual Motion," we have a critical exposition of the dynamics of irreversible phenomena and Clausius's principle of entropy. Further papers are promised dealing with the revival of atomism, the foundations of thermodynamics and similar subjects. On all these branches of theoretical physics Prof. Duhem speaks with authority, and his papers form a useful summary of the development of modern views of the dynamical properties of matter.

THE *Naturalist* for March contains an account of the work of the Yorkshire Boulder Committee for 1901–2.

IN *Naturwissenschaftliche Wochenschrift* of March 8 Herr L. Plate concludes his account of Weismann's theory of development.

WE have received the *Transactions* of the City of London Entomological and Natural History Society for 1902, which contain the president's address and a number of papers.

DR. O. ZACHARIAS, in *Biol. Centralblatt* of March 1, gives an account of the plankton of the Thames, based on the investigations recently undertaken by Dr. F. E. Fritsch, of the Jodrell Laboratory at Kew.

THE *Anales* of the National Museum of Buenos Aires (vol. i. part ii. of the third series) contains three papers by Dr. Ameghino. In the first of these, the author describes a number of mammalian remains—mostly fragmentary—from the well-known deposits of Tarija, in Bolivia, naming several species as new. The age of the Patagonian mammaliferous deposits forms the subject of the second communication; while in the third the primitive type of mammalian molar teeth is discussed.

AN interesting account of the mode of life of the giant land tortoises of the Galapagos Islands, and the present condition of the different species, is given by Mr. E. Heller in vol. v. of the *Proceedings* of the Washington Academy. From several of the islands of the group, the tortoises have disappeared; in Indefatigable Island, the extermination appears to have been quite recent, some Ecuadorians having told the author that not many years ago they saw a huge tortoise near the central crater. The land and sea iguanas of the Galapagos, and their habits, also come in for a share of attention, the author describing the land iguana of Barrington Island as a new species, under the name of *Conolophus pallidus.*

A MEMOIR on the geology of the country around Salisbury, by Mr. Clement Reid, has just been issued by the Geological Survey. It is accompanied by a capital colour-printed map, and both will no doubt be welcomed by the members of the Geologists' Association who make Salisbury their head-quarters for an excursion at Easter. The famous vale of Wardour, with its Portland and Purbeck strata at Tisbury and Chilmark, the Greensand and Chalk of the bordering heights, the Chalk of Salisbury Plain, and the Tertiary and Pleistocene deposits are duly described. It is interesting, too, to find approval of the Eolithic implements which Dr. Blackmore has so assiduously gathered together from the pits of Alderbury.

M. CHARLES RABOT, secretary of the French Commission on Glaciers, is the author of a pamphlet entitled "Essai de Chronologie des Variations Glaciaires" (extract from *Bulletin de Géographie Historique et Descriptive,* No. 2, 1902). In this work the author discusses the observations which he has collected from numerous places in different parts of the world, and comes to some interesting conclusions, which he summarises at the end. To state in a few words the results obtained, he points out that the same kind of glacial variation does not occur simultaneously in the regions he investigated; thus the last positive variation extended over a century and a half, the beginning of the primary increase occurring in Norway in 1700, and ending in the Alps in 1855–1860. A complete primary oscillation, *i.e.* an increase and decrease, appears to have a duration of one or two centuries. For Norway, for instance, the last primary increase began in 1700, and the decrease has not yet terminated; many other examples are given. There seems further to be a plurisecular period covering, in the case of the Alps, about three centuries.

THE Gresham Publishing Company has published, in drawing-book form, two capital models to show graphically the structure of the bee. One model is of the queen bee, the other of the drone. By the familiar device of overlapping sheets, suitably shaped and coloured, the external anatomy, the organs of respiration, digestion and reproduction, as well as the nervous system, can be followed by successively raising the sheets, which, when folded down, make realistic models of the two bees.

THE fourth instalment has been issued of the report on the physical and chemical soil survey of Dorsetshire, begun in 1898, and being conducted by the Department of Agriculture of the Reading University College. In an introductory note Prof. Percival, the director of the Agricultural Department, says it is hoped that during the present season an examination will take place of the flora and plant associations, more especially of the pastures and meadows, met with upon the different formations and drift areas of Dorsetshire. A thorough botanical or œcological survey taken in conjunction with geological and analytical data will be of great value, and it is proposed, if possible, to secure the assistance of Dorset field botanists.

A SECOND enlarged edition of Prof. A. Fischer's admirable "Vorlesungen über Bakterien" has been published by the firm of Gustav Fischer, Jena. The first edition was published in 1897, and was very favourably reviewed in these columns (vol. lviii. p. 77, 1898). The book is now double the size of the original volume, the number of pages having been increased from 186 to 374. Its value as a scientific treatise on bacteriology has thus been increased, and students of the subject may turn to the book with confidence that they will find the present state of knowledge of bacteriological science satisfactorily represented in it.

THE additions to the Zoological Society's Gardens during the past week include a Bosman's Potto (*Perodicticus potto*) from West Africa, presented by Captain Jas. Startin, R.N.; a Rhomb-marked Snake (*Trimerorhinus rhombeatus*) from South Africa, presented by Mr. George Vanderspar; six Marbled Newts (*Molge marmorata*), three Palmated Newts (*Molge palmata*), three Brown Newts (*Spelerpes fuscus*), European, deposited; two Herons (*Ardea cinerea*), European, received in exchange.

OUR ASTRONOMICAL COLUMN.

ASTRONOMICAL OCCURRENCES IN APRIL:—

April 6. 10h. 11m. Minimum of Algol (β Persei).
9. 11h. 48m. to 12h. 23m. Moon occults υ Leonis (mag. 4·5).
9. 15h. 16m. to 18h. 48m. Transit of Jupiter's Sat. III. (Ganymede).
11. Moon partially eclipsed visible at Greenwich:—
10h. 34·4m. First contact with the shadow.
12h. 13·0m. Middle of the eclipse.
13h. 51·6m. Last contact with the shadow.
Magnitude of the eclipse (☽'s diameter = 1) = 0·973.
15. Venus. Illuminated portion of disc = 0·832, Mars = 0·985.
20–22. Epoch of Lyrid meteoric shower (Radiant 271° + 33°).
26. 11h. 54m. Minimum of Algol (β Persei).
29. 8h. 43m. Minimum of Algol (β Persei).

STELLAR PARALLAX.—The *Transactions* of the Astronomical Observatory of Yale University (vol. i. part vi.) contain a valuable determination of the parallax of the ten first magnitude stars in the northern hemisphere by Dr. W. L. Elkin, the director of the Observatory. This investigation is part of a scheme for making a series of researches on the parallaxes of stars of successive orders of magnitude with the Yale heliometer, and was begun in the year 1885. In the volume before us Dr. Elkin gives details of the method of measurement adopted, the several series and comparison stars, the observations and reductions, and finally a discussion of the results. Referring here only to the actual results he obtained, the following table gives the adopted values of the parallax of each of the stars, with their probable errors:—

	Adopted Parallax.	Probable Error.
α Tauri	+0″·109	±0″·014
α Aurigæ	0·079	0·021
α Orionis	0·024	0·024
α Can. Min.	0·334	0·015
β Geminorum	0·056	0·023
α Leonis	0·024	0·020
α Bootis	0·026	0·017
α Lyræ	0·082	0·016
α Aquilæ	+0·232	0·019
α Cygni	−0·012	±0·023

MEASURES OF SATURN'S RINGS.—A series of measurements of the distance between the inner edge of the inner ring of Saturn and the planet itself has been made by Prof. F. E. Seagrave, of Providence. The mean result obtained shows a distance of 3″·698 on the preceding side and 4″·005 on the following side, and the diameter of the planet itself is given as 17″·618.

A comparison of this result with the mean of the results obtained by previous observers shows that there is no proof of the theory, first advanced by M. Struve in 1851, that the inner ring of the planet was expanding inwards, and that consequently the space between it and the planet was decreasing (*Popular Astronomy*, No. 103).

OBSERVATIONS OF JUPITER'S FIFTH SATELLITE.—In *Bulletin* No. 28 of the Lick Observatory, Prof. R. G. Aitken gives the details of the measurements made during 1900 and 1902 at the Lick Observatory of the positions of Jupiter's fifth satellite.

In each set of observations the position of the satellite is referred to that of one of the others, and the time of observation, the position angle, the distance in seconds and the number of settings are given in tabular form.

The satellite was observed on ten nights, a magnifying power of 270 being used during 1900, and a power of 350 during 1902. During the former period the planet itself was occulted by means of a drop of Indian ink on a clear glass plate placed between the micrometer threads and the eye-piece, but during 1902 a piece of suitably placed smoked mica was substituted for the glass plate.

OBSERVATIONS OF THE LIGHT OF NOVA PERSEI.—The second publication, by the Harvard College Observatory, of the variations in the magnitude of Nova Persei occurs in vol. xlviii. (No. 2) of the H.C.O. *Annals*.

About three thousand six hundred magnitude observations have been compiled from various sources bv Mr. Leon Campbell, under the direction of Prof. O. C. Wendell. The time of observation, the original comparison stars (when available), the magnitude of the Nova reduced to the Harvard photometric scale, the name of the observer and a reference number to the publication in which the observation was originally recorded are given for each observation, and the observations are set out in chronological order.

NEW CATALOGUE OF DOUBLE STARS.—A sixth catalogue of one hundred double stars, discovered by Mr. W. J. Hussey whilst using the 12-inch and 36-inch Lick refractors, is contained in *Bulletin* No. 27 of the Lick Observatory. The previous five catalogues, each containing the names, positions and particulars of one hundred new doubles, have appeared in earlier numbers of the *Astronomical Journal* and the Lick *Bulletins*.

Mr. Hussey calls special attention to two of the stars in the present catalogue, Nos. 507 and 580 respectively. No. 507 (D.M.+49°.95) is a remarkable triplet the components of which are of nearly equal magnitude (A.=9·3m., B.=9·5m., C.=9·8m.) and form an equilateral triangle, and the observer suggests that the measurements thereof should form a conclusive test for determining personal equations. No. 580 (ι Serpentis) is a probable binary the components of which are equal in magnitude (5·0m.) and the proper motion exceedingly small, viz. −0·00477s. and −0″·0582.

MAGNETIC OBSERVATIONS DURING ECLIPSES.—Dr. L. A. Bauer, of the Coast and Geodetic Survey, Washington, has collected all the available observations of the magnetic variations which are shown to take place during a total eclipse of the sun, and has published them in No. 4, vol. vii. of *Terrestrial Magnetism and Atmospheric Electricity*.

It is suggested in the preface to the article that the eclipse variation of the magnetic needle is analogous to the common diurnal variation, and that the causes of the two phenomena are also analogous, inasmuch as the diurnal variation may be caused by the continual eclipse of that side of the earth which, for the time being, is turned away from the sun. For this to be the case we have to premise that these variations are caused by some undetermined radiation from the sun which affects the magnetic needle.

This suggestion is supported by the following result deduced from the collected observations, which refer to every eclipse that has taken place since 1870:—"The precise effect of the eclipse magnetic variation is (1) opposite in the two magnetic hemispheres; (2) opposite for the morning and afternoon hours." In other words, "the nature of the eclipse variation is analogous to that of the diurnal variation, differing from it only in degree."

Supposing that the magnitude of the effect produced varies